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QUANTITATIVE STUDIES OF THE TUBERCULIN REACTION

II. The Efficiency of a Quantitative Patch Test in Detecting Reactors to Low Doses of Tuberculin [1]

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It was shown in a previous paper (*1*) that an intracutaneous tuberculin test using 1/10,000 mg. of Purified Protein Derivative (PPD) separates, with considerable accuracy, any population into two groups: (1) Those who are tuberculous or who have had contact with the tuberculous; and (2) those who have had, insofar as can be determined, no contact. For example, over 99 percent of a group of 468 adults with active tuberculosis reacted positively to the 1/10,000 mg. test dose, but fewer than 10 percent of a group of 309 children with no known history of contact with tuberculosis reacted to this test dose.

If, therefore, 1/10,000 mg. of PPD be accepted as the most efficient tuberculin testing dose, there immediately arises a question as to whether an efficient patch test can be developed that will detect all or almost all persons who react to this dose but only a minimum number of those who react to larger doses. The present study, a comparison of a quantitative patch test with the quantitative intracutaneous test, represents an attempt to answer this question.

No review of the literature on the patch test is presented here. For such a review, see Kereszturi (*2*).

MATERIAL AND METHODS

Quantitative evaluation of the tuberculin sensitivity of a large group of persons, as previously reported (*1*), has enabled us to determine the smallest dose of tuberculin PPD to which each person in the group reacts positively. The dose (in mg.) to which a person reacts deter-

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mines what we have called his *sensitivity level*. Knowledge of the tuberculin sensitivity level for each child in an orphanage in Ohio made that group an excellent population to use for the patch test study. The characteristics of the orphanage group have been previously reported. Some had a history of contact with cases of tuberculosis; others had had no known contact; but no significant active tuberculosis was found among either the children or the adults in the institution.

The patch test was performed on a total of 612 white children, aged 6 to 19 years. Of this group, 469 had been the subjects of quantitative intracutaneous tuberculin tests about 6 months before patch testing was done. Sensitivity levels were known, therefore, for the 469 children, but not for the remainder, 143, who had been admitted to the institution subsequent to the earlier study. In the light of the results of the quantitative study, the 143 children were, at the time of patch testing, given a single intracutaneous dose of 1/10,000 mg. of the same lot (98970) of PPD with which the previous sensitivity levels had been determined. Comparisons of patch test reactions with reactions to intracutaneous tests are therefore made in two ways: For the larger group, the sensitivity levels determined 6 months earlier are compared with the reactions to the several patches; in the smaller group, comparisons are made only on the basis of positive or negative reaction to the single, simultaneously administered diagnostic dose (1/10,000 mg. intracutaneously).

The quantitative method referred to above consists of injecting, in successive tests, a graduated series of doses of tuberculin PPD until either a positive reaction is induced or the largest dose in the series has been given. Reactions to intracutaneous tests are read at 24, 48, and 72 hours and measurements, in mm., are recorded for two diameters of edema and erythema. The term "positive reaction" as used here describes an area of edema with a mean diameter of at least 5 mm. at the 48-hour reading.

The patch test.—Under the direction of Dr. Florence Seibert, Sharpe and Dohme, Inc., prepared the patch tests, each of which consists of a strip of adhesive tape 1 inch wide and 3 inches long, on which are placed three pieces of filter paper about 1 cm. square. On each piece of filter paper a drop of the appropriate tuberculin solution is placed and allowed to dry.[2] Old Tuberculin (OT) and two different concentrations of PPD, prepared as follows, are used.

(1) Old Tuberculin (OT) was prepared in the usual manner. Dorset's synthetic medium was used to grow the bacilli, and the culture was concentrated and filtered as usual in the preparation of commercial Old Tuberculin. This OT was comparable in potency

[2] Since it has appeared from the reactions that there had been some diffusion of the tuberculin solution into the adhesive tape about the paper squares, it is believed that a preferable technique is to dip the filter paper in the tuberculin solution and allow it to dry before placing it on the adhesive tape.

to the International Standard OT when tested on tuberculous guinea pigs.

(2) The PPD used was the New International Standard made by Doctor Seibert and stored in its lyophilized state. It is a very potent product and is expected to serve as the standard of potency for all PPD preparations. The dried powder was diluted to the required concentration (either 1.0 percent or 0.1 percent) by adding 20 percent glycerine in phosphate buffer solution. At the suggestion of Doctor Seibert, the glycerine was added to aid in the skin absorption of the tuberculin. Two concentrations of PPD (1.0 percent and 0.1 percent) were used so as to make possible a quantitative evaluation of the reaction to the patch test. Concentrations of less than 0.1 percent were not used since preliminary tests with them had not been satisfactory.

The patch tests, applied after cleaning the skin with acetone, were left in place for 48 hours, and readings were made 48 hours after removal. Later experience convinced us that final reading could well be delayed until 3 to 5 days after removal of the patch.

Reactions to patch tests were classified as follows:

Classification	*Reaction*
Negative	None.
Doubtful	Questionable, occurring especially when the individual was sensitive to adhesive tape. Such reactions were considered "negative" in the analysis.
One plus	One or more definite papules in the area upon which the filter paper square had been placed.
Two plus	Papules outlining the entire area of the filter paper square.
Three plus	Papules or erythema extending beyond the area of the square. A few such reactions resulted in vesiculation and scaling.

For purposes of comparison, two different areas of the body were used for patch tests. The girls in the study group were tested on the right shoulder, on the fleshy curving part of the trapezius muscle midway between the acromion of the scapula and the spinous processes of the cervical vertebrae. The site described is an excellent one, since it discourages the children from removing the patch test and also assures excellent contact owing to the rounded muscle contour and the pressure of the clothes. The boys in the study group were patch tested on the left lower arm at least one inch below the elbow on the flexor surface. Hairy areas were avoided insofar as possible, and most of the patch tests were placed diagonally on the arm. Such patch tests as the children removed or lost before the proper removal time were replaced by new ones. Only one girl removed or lost a patch test but about 20 boys had to have replacements. In view of this fact it is felt that the shoulder or upper arm is preferable to the lower arm as a test site. No harmful reactions resulted in

either area, and no significant differences could be detected between reactions in the two areas.

RESULTS

Results of patch tests on 469 children for each of whom the tuberculin sensitivity level is known.—Table 1 and figures 1, 2, and 3 give the

TABLE 1.—*Comparison of the reaction to the patch test with three different patches with that to the intracutaneous quantitative tuberculin tests among 469 children aged 6–19 years*

Patch test	Degree of reaction	Level of tuberculin sensitivity (in mg.) by intracutaneous method													
		0.00001	0.0001	0.001	0.01	0.1	1.0	Neg. 1.0	0.00001	0.0001	0.001	0.01	0.1	1.0	Neg. 1.0
		Number							Percent						
Old Tuberculin	Negative	4	6	54	111	129	39	21	4.5	37.5	91.5	97.4	98.4	100.0	100.0
	One plus	8	2	3	2	1	---	---	9.0	12.5	5.1	1.7	.8	-----	-----
	Two plus	24	5	2	1	---	---	---	27.0	31.3	3.4	.9	-----	-----	-----
	Three plus	53	3	---	-----	1	---	---	59.5	18.7	-----	-----	.8	-----	-----
	Total	89	16	59	114	131	39	21	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0.1 percent PPD	Negative	13	10	59	113	131	39	21	14.6	62.5	100.0	99.1	100.0	100.0	100.0
	One plus	29	4	---	1	---	---	---	32.6	25.0	-----	.9	-----	-----	-----
	Two plus	28	1	---	-----	---	---	---	31.5	6.3	-----	-----	-----	-----	-----
	Three plus	19	1	---	-----	---	---	---	21.3	6.3	-----	-----	-----	-----	-----
	Total	89	16	59	114	131	39	21	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1.0 percent PPD	Negative	1	5	44	109	127	38	20	1.1	31.3	74.6	95.6	96.9	97.4	95.2
	One plus	4	2	8	4	3	1	1	4.5	12.5	13.6	3.5	2.3	2.6	4.8
	Two plus	5	3	3	-----	1	---	---	5.6	18.8	5.1	-----	.8	-----	-----
	Three plus	79	6	4	1	---	---	---	88.8	37.5	6.8	.9	-----	-----	-----
	Total	89	16	59	114	131	39	21	100.0	100.0	100.0	100.0	100.0	100.0	100.0

results of the patch tests, classified according to the individual tuberculin sensitivity levels obtained by quantitative intracutaneous tests. The degree of reaction to each of the three patches is recorded separately. It is evident from study of this material that, of the three, the 1.0 percent PPD patch was most efficient in detecting persons who react to 1/10,000 mg. or less of PPD given intracutaneously. However, the same patch also detected the largest proportion of persons who react only to doses of more than 1/10,000 mg.

The 1.0 percent PPD patch (fig. 1) missed 6 out of 105, or 5.7 percent, of those who react to 1/10,000 mg. or less of PPD, and picked up 26 out of 364, or 7.1 percent, of those who react only to doses larger than 1/10,000 mg. This patch also produced the largest number of 3-plus reactions.

The OT patch (fig. 2) failed to detect 10 out of 105, or 9.5 percent, of children who react to 1/10,000 mg. or less of PPD but it also detected 10 out of 364, or 2.7 percent, of those who react only to doses of more than 1/10,000 mg. Only two children who reacted to

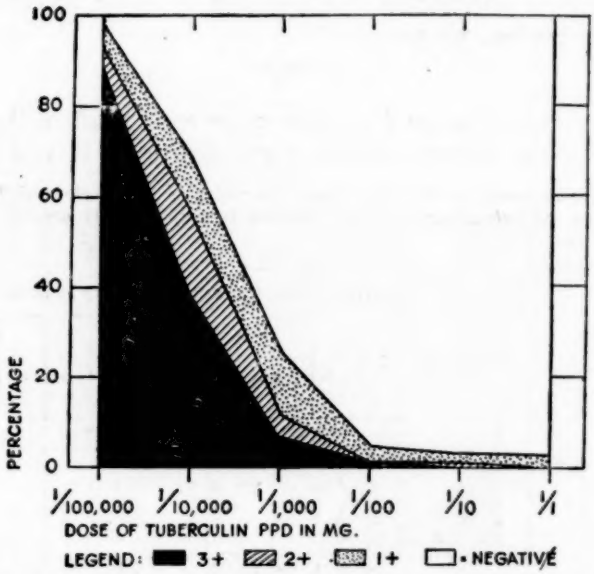

FIGURE 1.—Degrees of reaction to the 1.0 percent PPD patch among reactors to different intracutaneous doses of PPD.

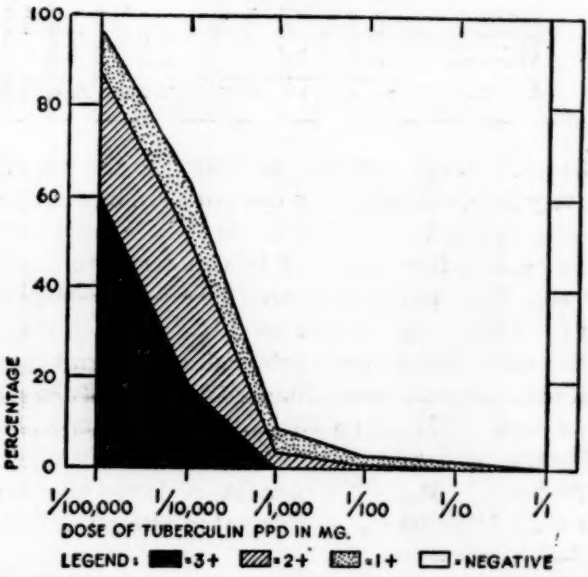

FIGURE 2.—Degrees of reaction to the OT patch among reactors to different intracutaneous doses of PPD.

the OT patch did not also react to the 1.0 percent PPD patch; both of these children had reacted to 1/100 mg. of PPD by the intracutaneous method.

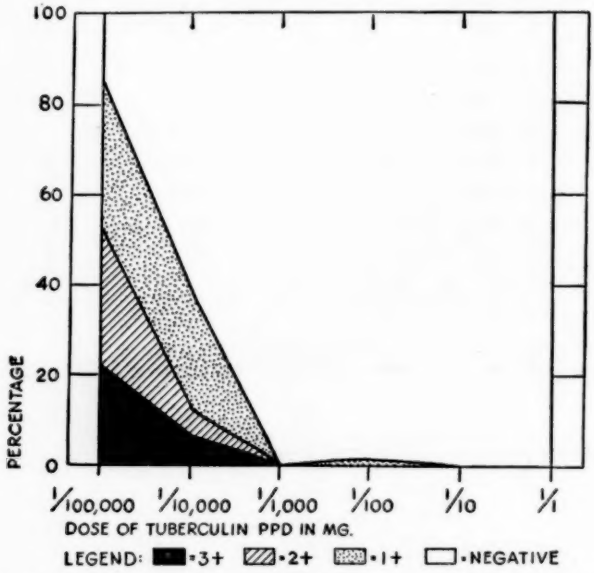

FIGURE 3.—Degrees of reaction to the 0.1 percent PPD patch among reactors to different intracutaneous doses of PPD.

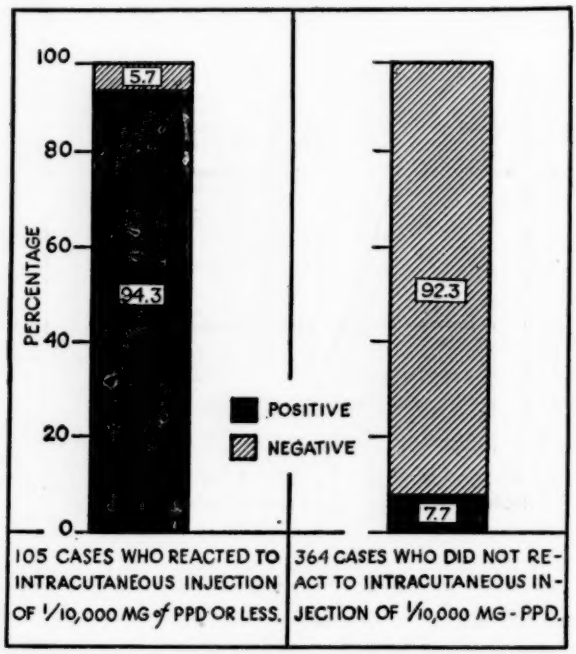

FIGURE 4.—Percentage of reactors to the patch test (any one of the three patches) among reactors and non-reactors to 1/10,000 mg. (or less) of PPD intracutaneously.

The 0.1 percent PPD patch (fig. 3) missed 23 out of 105, or 22 percent, of the reactors to 1/10,000 mg. or less but it picked up only 1 out of 364 of the reactors to the higher intracutaneous doses.

The number reacting to any one of the three patches is only slightly different from the number that react to the 1.0 percent PPD patch. Figure 4 shows that 99 out of 105, or 94.3 percent, of the reactors to 1/10,000 or less mg. of PPD intracutaneously also react to at least one (or all) of the three patches. In addition, 28 out of 364, or 7.7 percent, of those who reacted only to the larger intracutaneous doses reacted also to one or more of the three patches.

Results of simultaneous intracutaneous and patch tests.—Among the 143 children tested, using 1/10,000 mg. of PPD intracutaneously, 18 were positive and 125 were negative. Table 2 and figure 5 compare

TABLE 2.—*Comparison of the reaction to the various patch tests with that to the intracutaneous test with 1/10,000 mg. of PPD, among 143 children aged 6–19 years*

Intracutaneous (PPD 1/10,000 mg.)	Total examined	Patch test					
		Old Tuberculin		0.1 percent PPD		1.0 percent PPD	
		Negative	Positive	Negative	Positive	Negative	Positive
	Number						
Negative	125	121	4	122	3	118	7
Positive	18	6	12	5	13	1	17
	Percent						
Negative	100.0	96.8	3.2	97.6	2.4	94.4	5.6
Positive	100.0	33.3	66.7	27.8	72.2	5.6	94.4

the results of the intracutaneous tests with those of the patch tests. Details are given for each of the three patches: OT, 0.1 percent PPD, and 1.0 percent PPD.

In figure 5 it is seen that the OT patch picked up only 12 out of 18 of those who reacted to the intracutaneous test. The same patch picked up only 4 out of 125 cases who were negative to the intracutaneous test.

The 0.1 percent PPD patch picked up 13 out of 18 of those positive to the intracutaneous test and only 3 out of 125 of those negative to it.

The 1.0 percent PPD patch picked up 17 out of 18, or 94.4 percent, of the reactors to the intracutaneous test and 7 out of 125, or 5.6 percent, of the nonreactors.

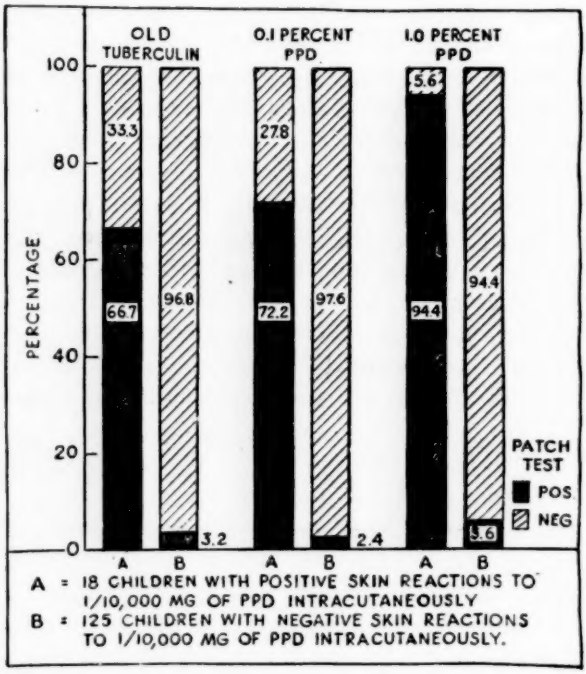

FIGURE 5.—Percentage of positive reactors to the various patches among 143 children arranged by (A) those with positive skin reactions to 1/10,000 mg. of PPD intracutaneously and (B) those with negative reactions to this test.

DISCUSSION

The foregoing presents an evaluation of the patch test in comparison with the intracutaneous test with PPD. In a group of 469 children aged 6 to 19 years whose sensitivity level to tuberculin had been quantitatively determined by the use of a number of doses of tuberculin of increasing concentration, it was found that sensitivity to the patch test was directly parallel to the sensitivity as determined by the quantitative intracutaneous method. While a large percentage of the most sensitive persons react to the patch test, the percentage of reactors declines sharply as sensitivity to tuberculin decreases. In a similar manner the severity of the reaction to the patch test decreases as the sensitivity to tuberculin decreases. Furthermore, the percentage of reactors discovered by the several patches varies directly with the potency of the patch; the most potent patch (1.0 percent PPD) discovers the largest number of reactors, and produces the greatest number of 3-plus reactions.

From the data presented, information is made available regarding the relative efficiency of various patches in the detection of persons having different levels of tuberculin sensitivity. An attempt is made especially to evaluate the efficiency of the patch test in detecting

persons who will react to 1/10,000 mg. or less of the particular PPD used in this study since it is felt that almost all the persons who have active tuberculosis and a large percentage of those in contact with active tuberculosis will react to that dose (*1*).

The particular patch test used in these studies detects a large proportion of persons who react to 1/10,000 mg. or less of PPD. Among a total of 612 children tested, of whom 123, or 20.1 percent, were positive to 1/10,000 mg. or less of PPD intracutaneously, the patch test was also positive in 116, or 94.3 percent. This means a loss of 5.7 percent of those whom, in the light of our earlier findings, it is desirable to detect. In addition, the patch test was positive in 36 out of 489, or 7.4 percent, of those who failed to react to the 1/10,000 mg. dose of PPD. It is thus evident that while the total error of the particular patch test used may appear sizeable—6 percent "missed" and 7 percent "extra" reactors—its importance depends upon the size of errors inherent in the method of testing. For example, in another series of observations on the intracutaneous test,[3] in which identical doses of tuberculin were given to an individual in both forearms at the same time and by the same technique, it was found that, for doses of about the level used here (1/10,000 mg.), a negative or doubtful reaction occurred in one arm while a positive reaction occurred in the other arm in 3.3 percent of the cases. It is to be emphasized that this result was obtained by employing *the same dosage of tuberculin from the same syringe in the two arms of the same individual.* It is thus evident that there is a sizeable error in the intracutaneous technique itself. That much greater variation occurs when larger doses of tuberculin are used in the two arms has appeared in our experience and has also been reported by Paretsky (*3*). If several different tuberculin products are used intracutaneously, even in both arms of the same persons at the same time, still larger variations are found (*4*, *5*).

From a study of figures 1 to 4 it appears that OT, as used here, is not superior to PPD as a patch testing material providing glycerine is mixed with the PPD to aid in its absorption. The OT patch used in these tests is of about equal potency to the 0.1 percent PPD patch but is weaker than the 1.0 percent PPD patch.

The 1.0 percent PPD patch was the best for detecting reactors to 1/10,000 mg. of PPD but, as might be expected, it also uncovered the largest proportion of reactors to the larger doses. It is possible that the 1.0 percent patch may induce too severe reactions in persons with active tuberculosis. However, in a limited experience with adults, no severe reactions were encountered. The optimal strength of tuberculin in the patches and the frequency of severe reactions remain to be

[3] To be published elsewhere.

determined by further experience with the test. It seems quite evident, however, that the patch test as used in this study is very efficient in detecting persons who are highly sensitive to tuberculin or react to relatively small doses. As shown in our previous paper, it is among these very persons that one will encounter almost all the individuals infected with tuberculosis. Hence, for case-finding surveys, the patch test may well prove more efficient than the intracutaneous test, if the well known loss through "refusal of the needle" is taken into account.

SUMMARY

The efficiency of the patch test in detecting reactors to tuberculin has been shown to depend on:

(1) The tuberculin sensitivity of the individual—the more sensitive the person the greater is the likelihood of his reacting to the patch test.

(2) The potency of the patches employed—the most potent patch will detect the most reactors. In this study the 1.0 percent PPD patch was the most potent. The OT and 0.1 percent PPD patches were weaker, and of about equal strength.

The site of application of the patch test seems to have little relation to the efficiency of the test.

If it is accepted that reactors to 1/10,000 mg. or less of PPD include most or all persons whom it is desirable to detect in a routine survey (*1*), the patch test as used in these studies will detect such persons with an error of about 6 percent "missed" and 7 percent "extra" reactors.

It should be noted that the New International Standard PPD was employed in the patch tests in this series and that 20 percent glycerine was mixed with it to aid in skin absorption.

ACKNOWLEDGMENTS

The authors wish to express their thanks to Dr. Florence B. Seibert for arranging for the preparation of the patch tests used in this study. Thanks are also due to the Medical Research Division of Sharp and Dohme, Inc., for furnishing these patch tests for experimental purposes.

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Appreciation is expressed to Passed Assistant Surgeon Carroll E. Palmer for his advice and encouragement.

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STUDIES OF THE ACUTE DIARRHEAL DISEASES [1]

V. AN OUTBREAK DUE TO *SALMONELLA TYPHI MURIUM*

By W. E. Mosher, Jr., *Assistant District Health Officer*, S. M. Wheeler, *Epidemiologist*, H. L. Chant, *District Health Officer, New York State Department of Health*, and A. V. Hardy, *Consultant, United States Public Health Service and Associate Professor of Epidemiology, DeLamar Institute of Public Health, Columbia University*

The outbreak described in this paper was encountered in an institution in which a study of diarrheal disorders was in progress. The investigation revealed a relatively high incidence of endemic *Shigella dysenteriae* infections, but during a period of 18 months Salmonella were encountered only in this outbreak. Its occurrence provided an opportunity for certain comparative observations of Shigella and Salmonella infections, to which particular attention will be given in this report.

The institution concerned provides for the training and custodial care of the mentally defective of all ages, except infants. With the exception of one case in a matron, the infections were limited to inmates. There were 238 clinical cases, in 86 (36.1 percent) of which the diagnosis was established by the isolation of *Salmonella typhi murium*. Two passive carriers were also discovered.

CLINICAL NOTES

The limited information was obtained from the physicians in charge of the cottages and hospital, the matrons in the cottages, and from our own examinations. Characteristically the illnesses had a sudden onset and a relatively severe though brief course. The prominent observations were fever, diarrhea, and vomiting, and the most frequent complaints were abdominal cramps, headache, backache, and dizziness. The temperature varied with the severity; it was occasionally low grade, but in more than half of the cases it was above 101° F. *per os*, and in 11 percent above 103° F. The stools were watery, often green, and in rare instances contained gross blood. The vomiting tended to be persistent and distressing. The patients usually appeared

[1] From the Division of Infectious Diseases, National Institute of Health, U. S. Public Health Service; the New York State Department of Health, and the DeLamar Institute of Public Health, Columbia University, with the assistance of the Division of Laboratories of the New York City Department of Health.

toxic and quite ill. The prominent physical finding was diffuse abdominal tenderness, in many cases with moderate to even marked rigidity. It was reported that severe rigors occurred in five cases. The usual duration of symptoms was 2 to 3 days; the most persistent illness lasted less than 1 week. There was one fatal case, a 32-year-old inmate who died after 24 hours of diarrhea, vomiting, and hyperpyrexia.

EPIDEMIOLOGY

The institution has a rural location. The 3,900 inmates are housed in 40 cottages which are distributed over a rolling wooded area about 1 mile long and one-half mile wide. There are four conveniently located service buildings, each with a large kitchen, a dining room for inmates and another for employees. Located elsewhere are two small kitchens which serve employees exclusively and one which provides for the hospital. The food for the low grade defectives and for those with physical disabilities is prepared in the service buildings and transported to the cottages.

In this outbreak the cases, with one exception, were limited to the inmates of the 12 cottages which are associated with one of the service buildings. Eight of these cottages housed women who went to the dining room for their meals, and four provided for the "infirm" females of all ages who ate food prepared in the same kitchen but served to them in the cottage. An average of 170 paid employees were also served from this kitchen, but the only case among these was in a matron who gave a history of having sampled a portion of food prepared for the inmates. The attack rates by cottages and groups are shown in table 1. Those living elsewhere and using food prepared in the six other kitchens remained free of infection. Five inmate helpers who lived in the cottages involved, but who worked and had their meals in other parts of the institution, became infected late in the epidemic. The relatively late onsets in these cases may be seen in table 2. These are considered secondary infections acquired through contact in the cottages with the primary cases.

The age distribution of the cases ranged from 6 to 77 years. There were no significant variations in attack rates according to age. The majority of the patients from the cottages for the high grade defectives, where most of the cases occurred, were between the ages of 15 and 30.

The epidemic was explosive in character, as is apparent from the distribution of onsets shown in table 2. Symptoms began to appear during the forenoon of November 24, 1939, when four persons became ill. More than one-half of the cases developed symptoms during the following day. In every cottage for the high grade defectives the largest number of patients became ill on this day. In the

TABLE 1.—*Distribution of cases among inmates and employees who obtained food from different sources*

Source of food	Total served	Cases	
		Number	Percent
Women's kitchen and inmates' dining room (high grade group):			
Cottage I	83	19	22.9
Cottage J	76	45	59.2
Cottage K	71	27	38.0
Cottage L	15	6	40.0
Cottage M	32	20	62.5
Cottage N	85	19	22.4
Cottage O	69	35	50.7
Cottage P	88	20	22.7
Women's kitchen and cottage dining rooms (infirm group):			
Cottage Y	123	5	4.1
Cottage Z	120	10	8.3
Cottage Alpha	120	6	5.0
Cottage Beta	118	20	16.9
Women's kitchen and employees' dining room	[1] 170	[2] 1	0.6
All other kitchens and dining rooms	----------	[3] 5	0.1
Total	[1] 3,830	238	----------

[1] Daily average attendance.
[2] Reported sampling the inmates' food.
[3] Lived in cottages L, M, and O, had daily contact with patients during outbreak, and believed to be secondary infections.

TABLE 2.—*Onsets as related to probable dates of exposure in a Salmonella and a Shigella outbreak*

Days following probable exposure	Cases with onset					
	Salmonella outbreak				"Newcastle" outbreak	
	Primary	Secondary	Total		Number	Percent
			Number	Percent		
0	0	0	0	0	1	1.0
1	25	0	25	10.7	12	12.4
2	126	0	125	53.9	43	44.3
3	37	0	37	16.0	26	26.8
4	28	1	29	12.4	6	6.2
5	8	1	9	3.9	7	7.2
6	4	1	5	2.2	2	2.1
7	0	0	0	0	0	0
8	0	2	2	.9	0	0
Unknown	6	0	6	----------	0	0
Total	233	5	238	100.9	97	100.0

cottages for the "infirm" the stated dates of onset tended to be later. This may be ascribed to the fact that the date recorded was usually the day on which the patient was kept in bed. From consideration of the known short incubation period in Salmonella infections and the close grouping of the dates of onset, the most probable date for the spread of the infection appeared to be November 23 (Thanksgiving Day). This opinion was supported by the record of three cases in inmates who ate in the suspected dining room only on Thanksgiving Day and of the matron who sampled the inmates' food. All four were typical cases with vomiting, diarrhea, abdominal pain, and fever, and all had stool cultures positive for *S. typhi murium*.

It was evident that an explosive epidemic of this character and of limited distribution would not arise through person-to-person contact. In this institution the water could not be suspected since it had a general distribution to all inmates and employees and was satisfactorily chlorinated. The milk was produced in the institution's dairy, was pasteurized, and delivered in cans to the cottages for the infirm and to the dining room. Investigation of the source and handling of the milk revealed no obvious possibility of contamination of that portion of the supply which would reach only the inmates of the affected cottages. The evidence definitely pointed to some food prepared in the one kitchen for inmates and not served to the paid employees.

The breakfasts of November 23 and 24 contained only foods served to both inmates and employees; this was true also of the cake, apples, nuts, and milk served for supper on November 23. For Thanksgiving dinner the following foods were provided: roast turkey and dressing, giblet gravy, mashed white and sweet potatoes, cranberries, sweet cider, pickles, and mince pie. The potatoes, cranberries, and pickles were served from one supply to both inmates and employees. The cider was not sent to the infirm group in which cases of infection occurred but did go to employees who were free of infection. There were but two dishes which differed for the inmate and the employee groups, the turkey with dressing and gravy, and the mince pie. The composition of the latter as served to the inmates was green tomatoes, raisins, apples, sugar, and spices. Neither meat nor eggs were included. It is improbable that Salmonella would be introduced in this food or would survive and multiply if introduced. Additional evidence against the mince pie was the definite history that it was not eaten by the one employee who became ill nor by the low grade defectives who also became infected.

In contrast to these negative observations a limited amount of reliable information tended to incriminate the turkey. The statement of the matron who became ill was particularly definite. There were two bed patients under her care. Trays were prepared in the kitchen and carried to the cottage. When she was about to take these to the patients she reported thinking, "My, that turkey looks good," and then picked up a small piece in her fingers and ate it. She was equally certain that she did not sample the pie or any other food. She became ill on November 25, the day of onset of a majority of the cases. Of the two bed patients whom she served, one later developed diarrhea with stool culture positive for *S. typhi murium*. In the cottages other than those for the infirm the turkey was eaten freely by all, but the low grade defectives often refused this solid food. Among them the infection rates were low. Another possible reason for the low attack rate among the infirm group was that trays were sent from

the kitchen to these cottages 2 hours before lunch was served to the high grade defectives in the dining hall. This extra 2 hours at room temperature may have allowed a heavier bacterial growth in the contaminated food.

The fowl purchased for the inmates came from a different source and was of a different grade than those served the employees. All the turkeys for the inmates were purchased from one company and were delivered in unbroken barrels to the different kitchens. Thirty-six birds were used by the inmates who became ill. On November 22 these were plucked, dressed, washed, and some but not all the birds were filled with a dressing consisting of bread crumbs, spice, and onions. Most of them were then cooked for 2 hours in individual compartments in a pressure steamer and a few in steam jacketed ovens. The temperature or pressure maintained was not known but it was agreed that the birds were well cooked. Overnight the cooked birds were stored in the cold room but were removed early Thanksgiving morning and remained at kitchen temperature for 4 to 5 hours. They were browned in the oven for 30 minutes, then carved, arranged on large platters around the dressing, and served. The giblets were steamed for 2½ hours on November 22 and were then mixed with pan gravy and flour.

Thus, the epidemiological evidence appeared to point to the turkey or its dressing and to raise questions concerning the cooking, but there was no evidence as to the original source of infection. The birds could not be traced to the farm on which they were raised so that it was not possible to determine whether they might have come from an infected flock. There was a difference in attack rate according to seating arrangement of the patients in the dining room. This suggested that certain birds were probably more heavily contaminated than others. There was little evidence of a possible rodent contamination of the turkeys or dressing in the kitchen. Five rats were trapped on the grounds of the institution; none revealed evidence of Salmonella infection.

LABORATORY OBSERVATIONS

The major objective of these studies, in addition to providing an etiological diagnosis, was to measure the duration of the infections from exposure to bacteriological recovery. The stool cultures were performed in the branch laboratory of the State Department of Health in New York City and in the laboratory of the DeLamar Institute. The former shared in the diagnostic examinations and sought for carriers among the food handlers and healthy contacts possibly exposed; the latter assumed responsibility for most of the follow-up examinations and all of the latter ones. The procedure followed was to have the fecal specimens collected in the cottages, and an appropriate

quantity placed directly in tetrathionate or selenite F broth. These were incubated overnight and then four plates were inoculated, using bismuth sulfite, S. S. agar, MacConkey's, and plain desoxycholate. The desoxycholate citrate agar was not employed, as plates prepared from the dehydrated product failed to grow the variety of Salmonella encountered. The organisms were identified by the usual cultural and serologic tests. Our own classification was confirmed by the late Dr. F. Schiff who kindly examined several of the early isolations and all of the very late ones.

The cultural findings by weeks are shown in table 3. The 39 negative and 4 positive cases which were excluded from this tabulation

TABLE 3.—*Persistence of Salmonella typhi murium and Shigella dysenteriae ("Newcastle") infections as determined by fecal cultures*

Week following infection	*Salmonella typhi murium* outbreak			*Shigella dysenteriae* ("Newcastle") outbreak		
	Persons under observation	Total continuing positive cases		Persons under observation	Total continuing positive cases	
		Number	Percent		Number	Percent
First	53	34	64.2	48	44	91.7
Second	72	36	50.0	94	72	76.6
Third	191	61	31.9	94	19	20.2
Fourth	195	41	21.0	94	3	3.2
Fifth	195	18	9.2	94	2	2.1
Sixth	195	13	6.7	94	0	0
Seventh	195	10	5.1	94	0	0
Eighth	195	6	3.1	94	0	0
Ninth	195	4	2.1	94	0	0
Tenth	195	3	1.5	94	0	0
Eleventh	195	2	1.0	94	0	0
Twelfth	195	1	.5	94	0	0
Thirteenth	195	[1] 1	.5	94	0	0

[1] Culture positive up to the end of the eighteenth week.

were either not reexamined regularly or not reexamined at all. The two passive carriers harboured the organisms for 4 and 9 weeks, respectively. Data regarding these carriers were not included in the tabulation.

As stated previously, it is believed that the infection was spread on Thanksgiving Day, November 23. Most of the illnesses began during the next 2 days. The outbreak was not reported until after the week end, on Monday the 27th. On this and the following day, specimens were taken from 14 hospitalized cases. With one exception all cultures yielded organisms subsequently identified as *Salmonella typhi murium*. The second culture on the one case which was negative yielded the same organism. The cases cultured later in the first week included several already recovered. Of the 53 cases examined within 1 week after the date of probable exposure, 26 (49.1 percent) were positive. However, eight of these which failed to give positive results later yielded the specific etiological agent. Thus 34 (64.2 percent) of the

53 cases under observation were positive either during or later than the first week. In the same way observations have been tabulated for each of the following weeks. As the study progressed, most of the cases with three consecutive negative tests were dropped; some which could be tested conveniently were continued to the fourth or fifth negative test. The later tests were, therefore, on those individuals who carried the organisms for more prolonged periods. The duration of the infection was counted from the probable date of exposure to that of the last positive stool culture. Thus it is seen that 31.9 percent harboured the organism for more than 2 weeks, 21.0 percent for more than 3 weeks, and 9.2 percent for more than 4 weeks. At the end of 2 months, four (2.1 percent) were still carriers, but at the end of 3 months there was only one carrier (0.5 percent). This patient was last positive on March 27, more than 4 months following exposure.

For comparison, the duration of *Shigella dysenteriae* ("Newcastle") infections, as found by one of us (A. V. H.) (*1*) in an epidemic involving nurses, is shown in table 3. Within 5 weeks following exposure all of these cases and carriers had become bacteriologically negative.

An adequate search for carriers among those without symptoms was not possible, but some evidence was obtained. In the course of the study of endemic diarrheal diseases routine bi-weekly cultures were being made of the inmates of an affected cottage. In these examinations two inmates with symptoms and one without symptoms yielded *Salmonella typhi murium*. In another cottage 20 inmates were ill and bacteriologically positive, 24 were ill but culturally negative, and 23 were originally considered free of symptoms. The latter were examined once only; two yielded *S. typhi murium*. One of these later admitted that she had had a mild disturbance so she was classified as a case, but the other maintained that she had been well throughout. These findings indicate only that subclinical infections can be identified and call attention to the desirability of ascertaining the relative frequency of their occurrence.

During the period when the individuals were evidently harbouring the organisms, they were successfully isolated by stool culture in approximately two trials out of three.

Blood for agglutination tests was collected 2 weeks after the day of probable exposure from 35 culturally positive cases, 52 negative cases, and from 17 individuals who had been free of symptoms. The highest dilution giving complete agglutination of *S. typhi murium* was 1:40. There was no significant difference in the titers in the three groups. One month later blood was drawn from 44 others. Few showed any agglutination and in only one was this complete in a titer of 1:20. With reactions of this type the agglutination test could have little value as a diagnostic procedure.

COMMENT

The illnesses observed in this epidemic were characteristic of *S. typhi murium* infections. They were relatively severe but of short duration, with fever, prostration, and gastro-intestinal symptoms. With few exceptions the patients were unquestionably ill or they were well. In the same institution individuals with proved Shigella infections have often had associated symptoms so mild that it was difficult to classify them as ill or well. Others have had moderate to severe or even fatal illnesses. The uniformity of the clinical manifestations in one infection and the wide variety in the other provides a marked contrast.

In this outbreak there were no typhoid-like illnesses. These are rarely observed in infections with those Salmonella strains which are pathogenic both to man and animals. Savage (*2*) mentions exceptions to this rule in outbreaks of typhoid character due to the "Dublin" and "Reading" strains of Salmonella. Blood stream and osteomyelitic infections in children due to *S. suipestifer* are becoming recognized as a clinical entity. A recent outbreak in New York State gives some evidence of a similar behavior of the "Derby" strain of Salmonella.

The opinion has been advanced by Savage (*3*) that the characteristic short and violent illness in *S. typhi murium* infection is associated with a prompt termination of the carrier state. This represents the prevailing opinion. The follow-up stool examinations in this outbreak indicate that the organisms do not always disappear promptly. One individual was known to be a carrier for 18 weeks after recovery. Perry and Tidy (*4*) made similar observations in the repeated examination of 44 cases occurring in an outbreak in an Army camp. The rate of disappearance of the organisms and the maximum duration of the carrier state (14 weeks) were very similar to those of the present outbreak.

In the study of endemic *Shigella dysenteriae* infections in the same institution, it became evident that the duration of the convalescent carrier state for Flexner infections was often long, that for Sonne commonly shorter. This period was found to be comparatively brief in the hospital epidemic due to *Shigella dysenteriae* ("Newcastle") in which nurses became infected. In the *S. typhi murium* outbreak here reported the carrier state was not protracted but was more prolonged than is usually expected. With data now available one can only speculate as to the influence of such factors as age of the host, nutritional status, specific resistance, and the character of the organism in determining the duration of this association between the host and the parasite.

Only two passive carriers of Salmonella were discovered, despite reasonably extensive cultural survey. In contrast, *Shigella dysen-*

teriae (Flexner and Sonne) were isolated frequently from individuals with no evidence of present or recent symptoms.

The epidemiological characteristics of Shigella and Salmonella infections in this institution have shown outstanding differences. The former has been observed as it spread slowly through the cottages, evidently through person to person contact, and successfully maintained itself for several months. One small explosive outbreak was encountered, evidently caused by food contamination. The Salmonella infections were introduced only in this explosive outbreak and were notable for the lack of proof of any significant amount of transfer from person to person. In each of the four cottages for the low-grade defectives, this infection was introduced, but it remained limited to those who developed symptoms at the time of the explosive outbreak. The infection totally disappeared from all cottages with the termination of the convalescent carrier states.

An opinion concerning the primary source of infection in this epidemic rests on speculation. Assuming that the Thanksgiving turkey was the vehicle, three alternatives can be considered: A human carrier or case, contamination of food by rats or mice, and *S. typhi murium* infection contracted by the turkeys before they were killed.

At the time of the Salmonella outbreak 5 of the 16 inmate kitchen helpers developed diarrhea and other symptoms in the days immediately following the Thanksgiving dinner. With one exception, all the other food handlers among inmates and employees were culturally and symptomatically negative. The exception was an inmate helper who is said to have "just cleaned" in the kitchen. She was found to be having diarrhea when rectal swabbings were taken on the food handlers 4 days after the exposure but she could not report when her symptoms began. Stool cultures on this inmate were positive for *S. typhi murium*. This individual and the 5 other ill inmate kitchen helpers ate portions of the food believed responsible for the epidemic. It would seem probable that a human, if responsible for this epidemic, would have handled some article of food in a more intimate manner than was likely in the case of this one positive person.

The negative cultural results on rats trapped near the service building do not entirely exclude rodent contamination. This method of infection has been convincingly demonstrated in an outbreak reported by Salthe and Krumweide (*5*). Jones and Wright (*6*) were actually able to find infected mouse feces in a sample of milk used by a patient. Commercial rat viruses containing Salmonella organisms have been implicated in outbreaks of *S. typhi murium* infection, but there is no history of such substances being used in this kitchen. According to Savage (*3*), rats are not so frequently

carriers of this strain as are mice. Meyer and Matsumura (*7*) found this organism in a virulent form in 3.9 percent of a series of 715 wild rats trapped in San Francisco. Nearly half of these rats were caught in the vicinity of packing houses. If the hypothesis of rodent contamination is considered, the most likely food would seem to be the ingredients of the turkey dressing, especially the bread crumbs. Covered receptacles and the general cleanliness and order in the kitchen would tend to obviate the probability of contamination by rats or mice.

Since the original flock from which the incriminated batch of turkeys came could not be determined, the existence of sick birds is only conjectural. Avian paratyphoid due to *S. typhi murium* is a recognized disease of fowl, including turkey. Jungherr and Clancy (*8*) report a small percentage of this infecting strain in lots of chicks sent to their laboratory for examination. It is probable that the incidence of this fowl disease is greater than reports indicate and that more *S. typhi murium* infection in poultry will be discovered as the laboratories become equipped to differentiate the Salmonella strains.

The infection in poultry is characterized by a generalized septicemia and hepatitis. A turkey so infected might be expected to harbour organisms in the deeper tissues. This raises one of the most perplexing problems in connection with outbreaks of bacterial food poisoning, which is to explain the survival of organisms in contaminated food after cooking. In the present instance, introduction of the infecting strain after roasting would give at the most 5 hours for the organism to multiply at room temperature before serving. This seems hardly long enough for massive contamination. Savage (*2*) cites several experiments on the temperature produced in the center of hams and other meats subjected to boiling. In most instances the temperature deep in the meats did not exceed 60° to 70° C. even after prolonged boiling. Perhaps more pertinent to this discussion is the work of Sawyer (*9*). Cooked spaghetti was the supposed vehicle of infection in a typhoid outbreak. The author inoculated a pan of spaghetti with *E. typhosus* and cooked it in a hot air sterilizer until the outside of the food was dark brown and partially charred. Even after such overcooking, abundant growth of the organism was demonstrated to within 2½ inches of the surface. The report of Dart (*10*) is good epidemiological evidence that such survival does take place in cooked food and can cause infection. In this case *S. typhi murium* infection was attributed to chicken soup and involved two related families. One bird was purchased and divided before cooking between the mother and her daughter who lived nearby. In each home the bird was boiled for 2 to 3 hours, then removed, and a portion of the soup eaten immediately thereafter. The remainder was saved without refrigeration until the following day, when it was rewarmed

and eaten. The onsets began that evening and the cases were unusually severe. The chicken was the only food shared by the two families, and one infirm individual who became ill was reported to have eaten only the soup.

The thermal death point of *S. typhi murium* is not high; 30 minutes at 60° C. will destroy this strain. Nevertheless evidence suggests that in this outbreak the organism likewise survived cooking. Slow cooling at room temperature took place. According to Savage and White (*11*), this is the optimal condition for growth of the organism in food. Turkey dressing is a good insulator against heat, and organisms deep in this dressing may well have been stimulated rather than destroyed by the temperature of the oven. The second likelihood is that a septic infection of the turkey would have lodged the Salmonellae in the deep tissues comparatively inaccessible to the penetration of heat. It may be noted that the marrow of roast fowl is often red whereas it becomes brown if the bird is boiled. The first organisms of this strain were discovered by DeNobele (*12*) in 1898 at Aertryck in Flanders. They came from the bone marrow of an infected calf, the meat from which caused an outbreak of diarrhea.

This and similar epidemics indicate the need for an experimental examination of cooking processes to ascertain the conditions under which organisms can survive in naturally infected meats or in contaminated dressings.

SUMMARY

An outbreak is reported of 238 cases of acute gastro-enteritis, with one death, in an institution for the mentally defective.

The illnesses were limited almost exclusively to the inmates of 12 cottages served by a common kitchen.

Available evidence indicated that the infection was spread during Thanksgiving dinner through turkey or its dressing.

S. typhi murium was isolated by stool culture from 86 (36.1 percent) of the cases.

A series of 195 patients were examined repeatedly to determine the duration of the convalescent carrier state. This was found to be longer than is usually expected. One patient carried the organism for 18 weeks.

Salmonella and Shigella infections are compared in certain respects.

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RELAPSING FEVER: *ORNITHODOROS PARKERI* A VECTOR IN CALIFORNIA [1]

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In the summer of 1939 approximately 125 *Ornithodoros parkeri* were collected from 3 ground squirrel burrows in Fresno and Kern Counties, Calif. (*1*). With the exception of a single specimen taken in Merced County in 1935 and only quite recently determined as *O. parkeri,* no other observations on this species in California were made until July 1940 when it was found (Wynns and Beck) in large numbers in the sandy soil of a cave in Stanislaus County where a case of relapsing fever recently had originated.[2]

Case history.—On June 19, 1940, Dr. S. E. Ghilotti, of Modesto, reported a case of relapsing fever in a male, aged 31. On May 15, while driving cattle on his ranch, J. G. took a nap in the shelter of a sandstone cliff with small caves in it, along a dry creek bed at an elevation of about 250 feet. After about an hour, he awakened to find himself "covered with ticks." A few days later he noted red spots on his arms. On May 28 he had a headache and felt feverish but did not go to bed. On June 1 he had a temperature of 100.6° F. and on June 2, 103.8° F. He had sweats, chills, pains in his back, headache,

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health, and the California State Department of Public Health, San Francisco.

[2] Since this report was written *O. parkeri* has been collected by the senior author in Butte, Yuba, Placer, and Alameda Counties. Also many other specimens have been collected in Stanislaus County (Davis and Wynns) and spirochetes again recovered.

and malaise. He then consulted his physician and was hospitalized. He was discharged on June 9 but on June 11 suffered a relapse with temperature of 105.0° F. and was again admitted to the hospital. On June 15 there was a second relapse with temperature of 105.0° F. at which time spirochetes were demonstrated in blood films. Treatment was instituted and there were no further relapses.

In 1937 a laboratory-proved case occurred in a cattleman not far from this area. The source of the infection was not determined.

Recovery of spirochetes from ticks.—Spirochetes were recovered from the *O. parkeri* collected in Fresno County in 1939 (strain No. 1) and from the 1940 collection from Stanislaus County (strain No. 2). Both strains were studied in white mice and the latter also in guinea pigs. A series of uninfected *O. parkeri*, in the first nymphal stage, were allowed to engorge on white mice infected with the two strains, and subsequently were tested by being allowed to feed on fresh white mice and guinea pigs. Ten such tests were made with strain 1 on white mice, nine with strain 2 on white mice, and eight on guinea pigs.

Tail blood of the mice and ear blood of the guinea pigs was examined daily for 21 days beginning on the fifth day following tick feeding. Daily temperatures were taken on guinea pigs. A maximum of three relapses was observed in both mice and guinea pigs. Spirochetes were present in the blood of one guinea pig on the day of release. The highest temperature recorded was 41.4° C.

DISCUSSION

Ornithodoros parkeri has been collected in eight States, viz, California, Colorado, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. Spirochetes have been recovered from ticks collected in California, Montana, Nevada, Utah, and Wyoming.

The case of relapsing fever reported is the first to be definitely attributed to *O. parkeri*. All other published cases in California have originated in timbered regions at high elevations, which is the typical habitat of *O. hermsi* as observed in California, Colorado, Idaho, and Oregon. The sandy floor of a cave is also a new type of habitat for *O. parkeri*, as all other collections have been made from rodents and the burrows of rodents (*2*) and burrowing owls (*3*).

SUMMARY

The first case of relapsing fever attributable to *Ornithodoros parkeri* is reported from Stanislaus County, Calif. *O. parkeri* had been previously collected from Merced County (1935) and Kern and Fresno Counties (1939). Spirochetes which produce relapses in white mice were recovered from ticks collected in Fresno County and

spirochetes which produce relapses in white mice and guinea pigs from ticks collected in Stanislaus County.

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DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, THIRD QUARTER OF 1941 [1]

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The data on the frequency of sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer during the third quarter and the first 9 months of 1940 and 1941, presented in table 1, are derived from analyses of periodic reports from industrial sick benefit associations, group insurance plans, and company relief departments. Interest in the table centers chiefly around the third quarter increase in the frequency of diarrhea and enteritis, and in the third quarter rate for pneumonia.

Diarrhea and enteritis, 1932–41.—The third quarter rates for 1941 and 1940 are 2.2 and 1.4 cases per 1,000, respectively, representing an increase of almost 60 percent in 1941. An inspection of the rates for the different quarters of each of the years 1932–41 reveals a notable variation with season, the third quarter rates consistently showing a peak. Of the 10 third quarter rates, those for 1941 and 1937 are approximately equal and well above the corresponding rates for the other 8 years.

Pneumonia.—The third quarter rates for 1941 and 1940 are approximately the same. However, the rate for pneumonia for the third quarter of 1940 was abnormally high and was the highest rate experienced for this quarter during the 10 years 1931–40.

[1] From the Division of Industrial Hygiene, National Institute of Health. The report for the second quarter appeared in PUBLIC HEALTH REPORTS, 56: 2052-2053 (October 17, 1941).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the third quarter of 1941 compared with the third quarter of 1940, and the first 9 months of 1941 compared with the first 9 months of the years 1936–40, inclusive*

Cause (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 males				
	Third quarter		First 9 months		
	1941	1940	1941	1940	1936–40
Sickness and nonindustrial injuries [1]	81.4	79.2	103.4	100.6	94.9
Nonindustrial injuries (160–195)	12.8	12.0	11.7	11.6	11.3
Sickness [1]	68.6	67.2	91.7	89.0	83.6
Respiratory diseases	21.4	21.2	43.8	40.4	36.2
Influenza and grippe (33)	5.5	6.4	21.4	19.0	17.5
Bronchitis, acute and chronic (106)	3.8	3.8	5.5	5.5	4.7
Diseases of the pharynx and tonsils (115b, 115c)	4.5	3.7	5.9	5.2	5.0
Pneumonia, all forms (107–109)	1.9	1.8	4.0	3.9	2.9
Tuberculosis of the respiratory system (13)	.8	.8	.7	.7	.8
Other respiratory diseases (104, 105, 110–114)	4.9	4.7	6.3	6.1	5.3
Nonrespiratory diseases	43.7	43.5	44.8	46.4	44.8
Digestive diseases	15.6	14.4	14.9	15.0	14.2
Diseases of the stomach, except cancer (117, 118)	4.3	4.0	4.0	4.0	3.9
Diarrhea and enteritis (120)	2.2	1.4	1.4	1.3	1.3
Appendicitis (121)	4.9	5.0	5.1	5.3	4.6
Hernia (122a)	1.3	1.4	1.6	1.6	1.6
Other digestive diseases (115a, 115d, 116, 122b, 123–129)	2.9	2.6	2.8	2.8	2.8
Nondigestive diseases	28.1	29.1	29.9	31.4	30.6
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	3.2	4.2	4.0	4.6	4.2
Other genitourinary diseases (133–138)	2.7	2.5	2.4	2.7	2.4
Neuralgia, neuritis, and sciatica (87b)	1.7	1.8	1.9	2.5	2.3
Neurasthenia and the like (part of 84d)	1.0	1.1	1.0	1.1	1.0
Other diseases of the nervous system (80–85, 87, except part of 84d, and 87b)	1.1	.8	1.2	1.0	1.1
Rheumatism, acute and chronic (58, 59)	3.3	3.6	3.9	4.2	4.1
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.5	2.5	2.8	2.9	2.8
Diseases of the skin (151–153)	3.6	3.3	2.8	2.9	3.0
Infectious and parasitic diseases [2] (1–12, 14–24, 26–29, 31, 32, 34–44)	2.0	2.0	2.6	2.0	2.5
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	7.0	7.3	7.3	7.5	7.2
Ill-defined and unknown causes (200)	3.5	2.5	3.1	2.2	2.6
Average number of males covered in the record	244,023	206,614	233,937	199,786	175,936
Number of organizations	25	26	25	26	

[1] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not included.

[2] Except influenza, respiratory tuberculosis, and the venereal diseases.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

November 2–29, 1941

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended November 29, 1941, the number reported for the corresponding period in 1940, and the median number for the years 1936–40.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—The number of reported cases of influenza rose from approximately 5,000 during the preceding 4-week period to approximately 9,600 for the 4 weeks ended November 29. Of the total number of cases, Texas reported 4,860, South Carolina, 1,166, Virginia, 658, Arizona, 420, Oklahoma, 409, Arkansas, 360, and California, 305. More than 85 percent of the cases occurred in those 7 States. Due apparently almost wholly to the high incidence in the States mentioned, the incidence for the country as a whole was more than one and one-half times that recorded for the corresponding period in 1940 and almost twice the 1936–40 median incidence for this period. Only minor excesses were reported from the East North Central, Mountain, and Pacific regions and in the North Atlantic and West North Central regions the incidence was below the average seasonal expectancy.

Meningococcus meningitis.—Five States, viz, New York (26 cases), Massachusetts (15 cases), Pennsylvania (14 cases), Illinois (11 cases), and New Jersey (7 cases), reported more than one-half of the total number of cases (145) of this disease that occurred during the current 4-week period. The excess in the country as a whole over last year and also over the 1936–40 median figure seemed to be due largely to the relatively high incidence in those States located in the North Atlantic and East North Central regions; in all other regions the incidence was below normal.

Poliomyelitis.—The number of cases (635) of poliomyelitis reported for the 4 weeks ended November 29 was about 20 percent below the incidence for the corresponding period in 1940, but it was about 15 percent above the normal seasonal level. States in the East South Central and Atlantic coast regions continued to report an unusually large number of cases, but in the West North Central, West South Central, Mountain, and Pacific regions the incidence was relatively low. With the exception of last year when the disease was still un-

usually prevalent after an outbreak in the North Central and South Atlantic regions, the current incidence is the highest for this period since 1930 when 866 cases were reported for this period.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period November 2–29, 1941, the number for the corresponding period in 1940, and the median number of cases reported for the corresponding period 1936–40

Division	Current period	1940	5-year median	Current period	1940	5-year period	Current period	1940	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	2,430	1,714	3,570	9,627	6,313	4,905	9,986	13,381	10,095
New England	27	17	53	6	16	23	1,296	1,494	1,016
Middle Atlantic	125	153	323	52	27	79	1,787	5,543	1,710
East North Central	314	277	574	305	247	265	1,064	4,267	972
West North Central	120	95	306	95	53	146	620	447	648
South Atlantic	779	492	948	2,121	1,537	1,537	2,096	367	641
East South Central	338	222	409	399	296	468	310	571	198
West South Central	502	293	447	5,685	1,183	1,400	591	131	173
Mountain	132	60	76	605	715	543	784	341	552
Pacific	93	105	163	359	2,239	199	1,438	260	310
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	145	88	135	635	796	543	10,289	10,005	14,007
New England	19	11	9	26	5	6	946	654	654
Middle Atlantic	47	17	29	155	48	46	1,814	1,744	2,644
East North Central	22	15	15	127	356	72	2,764	3,002	4,523
West North Central	5	7	8	39	142	59	1,105	1,223	1,807
South Atlantic	17	14	31	75	114	43	1,447	1,233	1,378
East South Central	15	16	31	139	35	35	879	828	828
West South Central	9	4	16	23	33	33	413	348	458
Mountain	4	1	8	20	27	27	341	405	485
Pacific	7	3	10	31	36	49	580	568	921
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [3]		
United States	45	128	333	591	578	775	14,261	15,192	[3] 15,192
New England	0	0	0	12	14	17	1,287	1,424	1,342
Middle Atlantic	0	0	0	144	104	104	3,711	5,420	4,954
East North Central	11	45	59	66	55	95	4,212	2,863	2,863
West North Central	14	26	129	31	32	65	743	1,220	447
South Atlantic	6	1	1	117	108	139	1,420	1,711	1,501
East South Central	1	11	11	76	80	77	538	583	531
West South Central	3	19	22	107	105	168	495	424	379
Mountain	2	4	55	23	44	63	658	322	442
Pacific	8	22	34	15	36	49	1,197	1,625	662

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.
[3] Three-year (1938–40) median.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended November 29 there were 2,430 cases of diphtheria reported, as compared with 1,714, 3,074, and 3,570 for the corresponding period in 1940, 1939, and 1938, respectively. The number of cases was 50 percent above the incidence in 1940, but it was only about 70 percent of the 1936–40 median figure for this period. A larger number of cases than might normally be

expected was reported from the Mountain and West South Central regions, but in all other regions the incidence was relatively low.

Measles.—The incidence of measles was slightly below the average seasonal level, approximately 9,900 cases being reported for the current period, as compared with an average of approximately 10,000 cases for the preceding 5 years. The largest increases over the seasonal expectancy were reported from the Pacific and South Atlantic regions, while minor increases were reported from each of the other regions except the West South Central; there the number of cases was slightly below the normal seasonal incidence.

Scarlet fever.—While the incidence of scarlet fever was slightly higher than in 1940, the number of cases (10,829) was only about 80 percent of the expected seasonal incidence. The New England, South Atlantic, and East South Central regions reported excesses over the 1936–40 average incidence, but in all other regions the incidence was relatively low.

Smallpox.—The number of cases (45) of smallpox reported was the lowest on record for this period. While the number of cases (6) reported in the South Atlantic region was not large, it was rather high for that region, the average incidence for the 5 preceding years being only 1 case. The North Atlantic regions remained free of the disease and all other regions reported an unusually low incidence.

Typhoid fever.—The typhoid fever incidence (591 cases) was slightly higher than it was during this period in 1940, but it was only about 75 percent of the preceding 5-year average incidence. The Middle Atlantic region reported an excess of cases, the East South Central region about the normal seasonal incidence, while all other regions reported a significantly low incidence.

Whooping cough.—The number of reported cases (14,261) of whooping cough was also relatively low. In the Atlantic Coast regions the disease was below normal, but all other regions reported excesses over the 1938–40 average incidence for this period. The excesses were small in the West North Central, South Central, and Mountain regions, but in the East North Central region the number of cases was about 1½ times the seasonal expectancy, and in the Pacific region the number of cases was almost twice the preceding 3-year average incidence.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended November 29, based on data received from the Bureau of the Census, was 11.4 per 1,000 inhabitants (annual basis). The rate for this period in 1940 was 11.4, as was also the 1938–40 average rate for the corresponding period.

DEATHS DURING WEEK ENDED DECEMBER 6, 1941

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 6, 1941	Corresponding week, 1940
Data from 87 large cities of the United States:		
Total deaths	8,494	8,550
Average for 3 prior years	8,628	
Total deaths, first 49 weeks of year	408,492	409,173
Deaths per 1,000 population, first 49 weeks of year, annual rate	11.7	11.7
Deaths under 1 year of age	526	513
Average for 3 prior years	506	
Deaths under 1 year of age, first 49 weeks of year	25,912	24,599
Data from industrial insurance companies:		
Policies in force	64,696,204	64,817,132
Number of death claims	11,280	12,569
Death claims per 1,000 policies in force, annual rate	9.1	10.1
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9.3	9.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occuring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 13, 1941

Summary

For the current week, the incidence of each of the 9 common communicable diseases included in the following tables, with the exception of influenza, was below the 5-year (1936–40) median expectancy. This is the first week since the week ended June 14 that the incidence of poliomyelitis has dropped below the 5-year median. For the current week only 3 States reported 5 or more cases.

The number of reported influenza cases increased from 2,742 to 2,995, slightly more than the median expectancy. For the corresponding week last year 29,864 cases were reported. Of the current total, Texas (1,423), South Carolina (376), Virginia (236), Arkansas (150) and Arizona (110) reported 2,295 cases, or about 77 percent. These were the only States reporting more than 100 cases during the current week.

Of 9 cases of smallpox, only two States reported as many as 2 cases. Typhoid fever also continues low. For the current week the incidence (105 cases) was below that for the corresponding period of any year on record. One case of Rocky Mountain spotted fever occurred in New York and 1 in South Carolina. Of 80 cases of endemic typhus fever, 36 were reported in Georgia, 17 in Alabama, and 10 in Tennessee.

The crude death rate for the current week in 88 large cities in the United States is 11.8 per 1,000 population, as compared with 11.9 last week and with 12.0 for the 3-year (1938–40) average. The cumulative rate to date, first 50 weeks of the year, is 11.7, the same as for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended December 13, 1941, and comparison with corresponding week of 1940 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40
	Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940	
NEW ENG.												
Maine	0	0	2	1	7	------	263	93	42	0	0	0
New Hampshire	2	1	0	1	------	------	4	0	1	0	0	0
Vermont	3	0	0	------	------	------	0	21	21	0	0	0
Massachusetts	7	3	5	------	------	------	143	302	302	1	2	1
Rhode Island	4	0	0	------	------	------	19	2	2	0	0	0
Connecticut	0	1	2	5	6	2	74	9	60	2	0	0
MID. ATL.												
New York [1] [3]	20	15	27	[3] 8	[3] 20	[3] 14	214	985	425	2	5	5
New Jersey	6	11	16	13	3	11	17	301	86	1	0	1
Pennsylvania [3]	8	14	32	------	------	------	723	1,170	67	3	1	3
E. NO. CEN.												
Ohio	20	8	22	13	23	23	53	139	27	0	3	3
Indiana	3	14	18	12	213	34	33	14	11	1	1	1
Illinois	41	16	33	5	18	17	40	737	34	2	1	1
Michigan [4]	6	15	15	7	9	3	86	807	305	2	3	1
Wisconsin	0	1	1	34	42	44	129	417	141	1	0	0
W. NO. CEN.												
Minnesota	2	0	1	3	1	1	66	11	41	0	0	0
Iowa	0	3	4	------	1	4	44	59	43	1	0	0
Missouri	11	13	13	3	27	44	6	23	7	1	1	1
North Dakota	1	5	2	9	28	18	60	2	2	1	0	0
South Dakota	2	0	0	------	------	------	3	5	5	0	0	0
Nebraska	2	0	2	------	3	------	4	6	6	0	0	0
Kansas	2	4	7	48	16	11	97	59	23	3	0	1
SO. ATL.												
Delaware	1	0	0	------	------	------	3	14	4	0	0	0
Maryland [4]	9	4	12	9	10	10	115	4	5	1	0	0
Dist. of Col.	0	0	5	1	2	------	2	0	1	0	0	0
Virginia	36	23	33	236	228	148	94	126	32	1	2	2
West Virginia	8	2	18	11	27	27	128	3	16	3	1	3
North Carolina [3]	44	35	63	8	11	11	412	19	270	0	1	1
South Carolina [1] [3]	5	11	11	376	359	410	34	10	11	0	0	1
Georgia [3]	22	7	14	80	214	77	57	1	1	1	0	0
Florida [3]	14	12	7	11	13	6	3	1	6	1	0	0
E. SO. CEN.												
Kentucky	5	10	17	13	31	29	13	147	10	3	3	3
Tennessee [3]	10	8	12	54	52	52	52	22	36	1	2	2
Alabama [3]	23	22	24	98	112	189	41	35	12	0	1	1
Mississippi [3]	8	13	15	------	------	------	------	------	------	2	0	1
W. SO. CEN.												
Arkansas	24	7	15	150	234	134	50	23	17	0	1	1
Louisiana [3]	4	11	14	1	321	10	4	0	2	1	1	1
Oklahoma	20	27	16	87	537	98	37	9	5	0	3	2
Texas [3]	69	46	50	1,423	671	499	236	20	36	3	1	1
MOUNTAIN												
Montana	1	3	1	12	60	18	28	4	4	0	0	0
Idaho	0	0	0	------	1,113	11	11	3	59	0	0	0
Wyoming	0	0	0	4	4	------	0	2	2	1	0	0
Colorado	14	5	7	25	42	23	244	154	7	0	0	0
New Mexico	0	0	5	4	1	------	34	51	49	1	0	0
Arizona	8	0	7	110	1,662	88	22	47	5	0	0	0
Utah [4]	0	3	1	9	8,288	33	45	2	18	0	0	0
Nevada	2	0	------	------	430	------	0	0	------	0	0	------
PACIFIC												
Washington	0	7	6	12	914	1	7	15	38	1	2	1
Oregon	3	1	1	15	978	44	68	26	17	0	1	1
California	16	12	33	84	13,133	34	607	44	71	2	0	3
Total	486	393	654	2,995	29,864	2,047	4,425	5,935	4,816	43	36	50
50 weeks	16,147	15,132	26,697	592,693	221,737	176,258	859,846	263,575	283,762	1,958	1,604	2,740

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 13, 1941, and comparison with corresponding week of 1940 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40
	Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940		Dec. 13, 1941	Dec. 14, 1940	
NEW ENG.												
Maine	0	0	0	11	12	24	0	0	0	0	0	1
New Hampshire	1	0	0	13	2	3	0	0	0	0	0	0
Vermont	0	0	0	0	18	4	0	0	0	0	1	1
Massachusetts	1	0	0	274	169	158	0	0	0	3	5	2
Rhode Island	0	0	0	12	6	11	0	0	0	0	0	0
Connecticut	4	0	0	16	45	63	0	0	0	1	0	1
MID. ATL.												
New York [1,2]	8	1	0	324	300	398	0	0	0	[2]7	5	6
New Jersey	2	0	1	124	122	94	0	0	0	0	3	3
Pennsylvania [2]	3	1	1	226	247	346	0	0	0	7	6	8
E. NO. CEN.												
Ohio	2	12	1	214	152	274	0	1	1	7	0	3
Indiana	3	1	0	87	108	152	0	1	4	4	3	3
Illinois	5	8	1	[2]207	355	355	[2]0	1	2	[2]3	1	1
Michigan [4]	0	2	2	203	185	363	1	6	2	1	4	4
Wisconsin	0	13	0	147	149	160	1	6	6	1	1	0
W. NO. CEN.												
Minnesota	2	2	2	92	76	129	0	29	21	0	1	0
Iowa	0	3	1	55	75	94	2	1	11	1	1	1
Missouri	1	3	1	89	94	116	0	1	1	1	6	5
North Dakota	1	0	0	11	25	29	0	2	5	0	0	0
South Dakota	0	0	0	33	14	31	0	0	3	0	0	0
Nebraska	0	1	0	27	36	31	0	0	1	0	1	1
Kansas	1	2	1	70	65	144	0	1	1	1	1	0
SO. ATL.												
Delaware	1	0	0	23	11	12	0	0	0	0	0	0
Maryland [4]	0	0	0	47	57	57	0	0	0	13	3	3
Dist. of Col.	0	0	0	9	9	10	0	0	0	2	0	1
Virginia	1	3	0	65	67	55	0	0	0	11	5	5
West Virginia	0	3	1	48	52	66	0	0	0	1	8	2
North Carolina [2]	4	3	0	78	78	65	0	0	0	4	9	4
South Carolina [1,2]	1	2	0	12	13	13	0	0	0	1	1	1
Georgia [2]	0	1	1	44	42	42	0	0	0	0	4	6
Florida [4]	0	3	0	7	4	5	0	1	0	2	6	3
E. SO. CEN.												
Kentucky	1	2	1	77	84	81	1	0	0	1	6	3
Tennessee [2]	5	0	0	60	100	60	0	0	0	0	4	1
Alabama [2]	1	0	1	41	21	21	0	0	0	1	1	1
Mississippi [2]	1	2	1	16	11	11	0	0	0	1	0	1
W. SO. CEN.												
Arkansas	1	0	1	5	16	20	0	2	1	5	1	4
Louisiana [4]	0	1	1	7	5	15	1	0	0	3	7	7
Oklahoma	1	1	1	27	27	27	2	4	4	3	8	7
Texas [2]	1	1	1	54	63	99	0	2	2	4	6	14
MOUNTAIN												
Montana	0	0	0	24	16	31	0	1	6	0	1	1
Idaho	0	0	0	7	15	13	0	1	2	1	1	1
Wyoming	0	1	0	5	8	8	0	0	1	1	1	0
Colorado	0	1	1	26	31	31	0	0	5	1	3	3
New Mexico	0	1	1	8	10	15	0	0	0	1	2	3
Arizona	1	0	0	9	5	8	1	0	0	1	2	0
Utah [4]	0	1	0	13	7	26	0	0	0	0	1	0
Nevada	0	0	-----	10	1	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	3	6	0	37	28	41	0	0	2	0	0	0
Oregon	0	1	1	5	19	34	0	0	7	1	0	1
California	2	3	5	131	75	223	0	2	2	10	3	8
Total	58	85	67	3,100	3,130	4,234	9	62	174	105	119	128
50 weeks	8,962	9,685	7,203	[2]121,875	149,649	179,436	[2]1,332	2,354	9,346	[2]8,344	9,405	14,020

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 13, 1941, and comparison with corresponding week of 1940—Continued

Division and State	Whooping cough	
	Week ended	
	Dec. 13, 1941	Dec. 14, 1940
NEW ENG.		
Maine	45	27
New Hampshire	14	12
Vermont	8	7
Massachusetts	199	287
Rhode Island	34	2
Connecticut	44	127
MID. ATL.		
New York [1 2]	640	403
New Jersey	261	174
Pennsylvania [2]	216	597
E. NO. CEN.		
Ohio	223	305
Indiana	19	13
Illinois	225	176
Michigan [4]	352	353
Wisconsin	273	118
W. NO. CEN.		
Minnesota	27	110
Iowa	16	10
Missouri	20	146
North Dakota	13	11
South Dakota	2	6
Nebraska	3	28
Kansas	33	124
SO. ATL.		
Delaware	2	17
Maryland	53	80
Dist. of Col.	10	10
Virginia	35	82
West Virginia	35	45
North Carolina [3]	118	268
South Carolina [1 3]	28	38
Georgia [3]	13	9
Florida [3]	10	12
E. SO. CEN.		
Kentucky	60	104
Tennessee [3]	12	79
Alabama [3]	6	50
Mississippi [3]		
W. SO. CEN.		
Arkansas	2	21
Louisiana [3]	1	4
Oklahoma	4	61
Texas	69	202
MOUNTAIN		
Montana	59	14
Idaho	3	4
Wyoming	15	0
Colorado	38	40
New Mexico	16	23
Arizona	60	11
Utah [4]	23	19
Nevada	5	1
PACIFIC		
Washington	103	78
Oregon	35	16
California	151	288
Total	3,633	4,612
50 weeks	202,754	164,231

[1] Rocky Mountain spotted fever, week ended Dec. 13, 1941, 2 cases, as follows: New York, 1; South Carolina, 1.

[2] New York City only.

[3] Typhus fever, week ended Dec. 13, 1941, 80 cases as follows: New York, 1; Pennsylvania, 1; North Carolina, 1; South Carolina, 1; Georgia, 36; Florida, 4; Tennessee, 10; Alabama, 17; Mississippi, 2; Louisiana, 3; Texas, 4.

[4] Period ended earlier than Saturday.

[5] Instead of the figures published, later information shows, for the week ended November 8, in Illinois, 155 cases of scarlet fever, 2 cases of typhoid fever, and 1 case of smallpox; for the week ended November 29, in New York, 16 cases of typhoid fever. See Public Health Reports of November 14, p. 2223, and December 5, p. 2352.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 29, 1941

This table lists the reports from 131 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	------	0	1	2	5	0	0	0	5	25
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	25
Manchester	0	------	0	3	0	11	0	0	0	0	14
Nashua	0	------	0	3	0	0	0	0	0	14	6
Vermont:											
Barre	0	------	------	0	------	0	0	------	0	0	------
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	1	23	11	30	0	10	1	41	203
Fall River	1	------	0	5	0	18	0	0	0	1	28
Springfield	0	------	0	8	0	9	0	1	0	21	29
Worcester	0	------	0	1	4	11	0	1	0	18	47
Rhode Island:											
Pawtucket	1	------	------	18	------	1	0	------	0	4	------
Providence	0	------	0	2	1	5	0	2	0	50	62
Connecticut:											
Bridgeport	1	------	0	2	0	7	0	0	0	0	33
Hartford	0	------	0	2	5	2	0	0	0	3	37
New York:											
Buffalo	0	------	0	0	6	15	0	8	0	16	133
New York	12	4	2	25	48	70	0	54	8	309	1,431
Rochester	0	------	0	0	1	2	0	2	0	10	57
Syracuse	0	------	0	0	4	3	0	0	0	19	43
New Jersey:											
Camden	0	1	0	0	5	3	0	1	0	4	39
Newark	0	4	0	3	4	13	0	6	0	38	117
Trenton	0	2	0	0	0	9	0	5	0	10	41
Pennsylvania:											
Philadelphia	2	1	1	5	18	52	0	19	0	42	461
Pittsburgh	1	------	0	4	13	6	0	5	0	19	133
Reading	0	------	0	0	0	0	0	0	0	1	22
Scranton	0	------	------	1	------	1	0	------	0	1	------
Ohio:											
Cincinnati	0	------	0	1	3	15	0	8	0	8	138
Cleveland	1	11	0	2	9	39	0	15	1	33	188
Columbus	1	------	0	3	3	7	0	0	0	13	80
Toledo	0	1	0	0	1	4	0	5	0	19	83
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	0	6
Fort Wayne	0	------	0	1	2	0	0	0	0	0	20
Indianapolis	5	------	2	3	7	27	0	3	0	12	121
South Bend	0	------	0	0	1	2	0	0	0	0	20
Terre Haute	0	------	0	0	2	1	0	0	0	0	25
Illinois:											
Alton	0	------	0	0	1	3	0	1	0	1	15
Chicago	15	2	1	6	31	64	0	37	1	146	682
Elgin	1	1	0	1	1	1	0	0	1	15	4
Moline	0	------	0	0	0	0	0	0	0	2	12
Springfield	0	------	0	0	1	3	0	0	0	0	28
Michigan:											
Detroit	3	------	1	8	5	85	0	23	1	51	274
Flint	0	------	0	0	2	3	0	1	0	5	26
Grand Rapids	0	------	0	1	1	0	0	0	1	8	33
Wisconsin:											
Madison	0	------	0	4	0	1	0	0	0	3	24
Milwaukee	0	------	0	3	5	22	0	0	0	117	90
Racine	0	------	0	0	0	3	1	0	0	12	17
Superior	0	------	0	0	0	0	0	0	0	12	9
Minnesota:											
Duluth	0	------	0	0	0	2	0	0	0	4	27
Minneapolis	1	------	0	0	4	11	0	1	0	13	95
Iowa:											
Cedar Rapids	0	------	------	0	------	2	0	------	0	1	------
Davenport	0	------	------	0	------	0	0	------	0	0	------
Des Moines	2	------	0	1	2	2	0	0	0	0	43
Sioux City	0	------	------	0	------	0	0	------	2	2	------
Waterloo	0	------	------	1	------	2	0	------	0	2	------
Missouri:											
Kansas City	0	------	1	1	6	13	0	6	0	8	99
St. Joseph	0	------	0	1	6	1	0	1	0	1	25
St. Louis	4	1	0	2	13	15	0	3	0	12	209

City reports for week ended November 29, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	0	6
Grand Forks	0	------	------	0	------	0	0	------	0	2	------
Minot	0	------	0	33	0	1	0	0	0	0	8
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	4	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	10
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	1	------
Omaha	0	------	0	1	2	5	0	1	0	0	43
Kansas:											
Lawrence	0	------	0	0	0	0	0	1	0	0	6
Topeka	0	------	0	1	0	3	0	0	0	1	20
Wichita	0	------	0	0	1	5	0	1	1	1	28
Delaware:											
Wilmington	0	------	0	0	2	8	0	0	0	0	30
Maryland:											
Baltimore	4	3	0	71	22	31	0	7	0	33	225
Cumberland	0	------	0	0	2	0	0	0	0	0	11
Frederick	0	------	0	0	0	0	0	0	0	0	5
Dist. of Col.:											
Washington	1	1	0	4	13	18	0	10	1	32	195
Virginia:											
Lynchburg	1	------	0	0	0	0	0	0	0	0	6
Richmond	7	------	1	0	3	5	0	0	0	0	48
Roanoke	0	------	0	0	1	1	0	1	0	4	23
West Virginia:											
Charleston	0	------	0	1	2	6	0	0	0	2	15
Huntington	1	------	------	0	------	3	0	------	0	0	------
Wheeling	0	------	0	8	1	1	0	0	0	2	18
North Carolina:											
Gastonia	1	------	------	0	------	1	0	------	0	0	------
Raleigh	0	------	0	0	0	1	0	0	0	4	5
Wilmington	1	------	0	7	2	2	0	0	0	2	11
Winston-Salem	1	------	0	223	1	1	0	2	0	4	18
South Carolina:											
Charleston	0	29	0	0	2	0	0	1	1	0	16
Florence	0	------	0	0	0	3	0	0	0	0	5
Greenville	0	------	0	0	0	1	0	0	0	0	18
Georgia:											
Atlanta	1	3	1	0	4	15	0	5	1	2	91
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	0	4	0	16	2	1	0	1	0	0	29
Florida:											
Miami	0	1	1	0	1	1	0	1	0	1	37
St. Petersburg	2	------	0	0	1	1	0	0	0	2	24
Tampa	0	1	0	0	2	0	0	0	0	0	26
Kentucky:											
Ashland	1	------	0	0	1	0	0	1	0	6	8
Covington	0	------	0	0	1	3	0	1	0	0	10
Lexington	0	------	0	1	1	1	0	2	0	2	15
Tennessee:											
Knoxville	0	------	0	0	0	2	0	1	0	3	15
Memphis	2	4	1	3	1	4	0	2	1	16	61
Nashville	0	------	0	0	2	5	0	1	0	3	47
Alabama:											
Birmingham	2	2	0	0	2	10	0	2	0	0	73
Mobile	0	2	0	7	1	1	0	1	0	0	22
Montgomery	1	5	------	0	------	2	0	------	0	0	------
Arkansas:											
Fort Smith	1	------	------	0	------	0	0	------	0	0	------
Little Rock	0	7	0	0	0	2	0	1	0	1	31
Louisiana:											
Lake Charles	0	------	0	0	2	0	0	0	0	0	7
New Orleans	2	6	2	1	13	5	0	12	0	2	144
Shreveport	2	------	0	1	5	0	0	5	2	0	45
Oklahoma:											
Oklahoma City	0	8	0	0	4	2	0	0	0	0	38
Tulsa	5	------	0	56	1	5	0	0	0	0	9
Texas:											
Dallas	9	------	0	40	6	7	0	1	0	6	60
Fort Worth	0	------	0	1	0	2	0	1	0	3	50
Galveston	0	------	0	0	2	2	0	0	0	0	10
Houston	2	------	0	0	10	4	0	5	1	1	98
San Antonio	0	21	3	1	3	1	0	8	1	3	58

City reports for week ended November 29, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Montana:											
Billings	0	------	0	0	1	1	0	0	0	0	7
Great Falls	0	------	0	5	1	0	0	0	0	0	11
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	0	0	0	0	0	5
Idaho:											
Boise	0	------	0	6	0	3	0	0	0	4	2
Colorado:											
Colorado Springs	0	------	0	1	1	2	0	0	0	3	7
Denver	7	27	1	12	5	10	0	0	0	20	84
Pueblo	1	------	0	68	0	0	0	0	0	0	8
New Mexico:											
Albuquerque	1	------	0	2	3	1	0	3	0	3	12
Arizona:											
Phoenix	1	44	--------	0	-------	0	0	-------	0	0	--------
Utah:											
Salt Lake City	0	------	0	2	3	1	0	1	0	4	36
Washington:											
Seattle	0	------	0	0	5	2	0	5	0	18	116
Spokane	0	------	0	0	1	4	0	1	0	2	25
Tacoma	0	------	0	0	0	2	0	0	0	5	32
Oregon:											
Portland	1	3	0	1	2	2	0	1	0	7	80
Salem	0	------	--------	0	-------	0	0	-------	0	0	--------
California:											
Los Angeles	6	20	1	17	6	18	0	5	0	14	376
Sacramento	0	------	0	7	4	5	0	2	0	3	35
San Francisco	0	3	0	3	5	4	0	5	0	7	183

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				District of Columbia:			
Boston	1	0	1	Washington	1	0	1
New York:				Florida:			
Buffalo	1	0	0	Tampa	0	0	1
New York	10	1	2	Tennessee:			
Syracuse	0	1	2	Nashville	0	0	2
New Jersey:				Texas:			
Newark	1	0	1	Dallas	0	0	1
Pennsylvania:				Colorado:			
Philadelphia	1	0	2	Denver	1	0	0
Pittsburgh	2	0	0	Arizona:			
Ohio:				Phoenix	0	0	1
Cincinnati	0	0	1	Oregon:			
Illinois:				Portland	1	0	0
Chicago	2	0	4	California:			
Maryland:				Los Angeles	0	0	1
Baltimore	1	0	0	San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: Newark, 2; Philadelphia, 1; Denver, 1 Deaths: New York, 1; Minneapolis, 1.
Pellagra.—Cases: Charleston, S. C., 1; Savannah, 2.
Typhus fever.—Cases: New York, 1; Philadelphia, 1; Raleigh, 1; Atlanta, 2; Savannah, 1; Miami, 2; Nashville, 3; Mobile 1; New Orleans, 2; Houston, 1.

Rates (annual basis) per 100,000 population for a group of 87 selected cities (population 1940, 33,432,006)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases
		Cases	Deaths							
Week ended Nov. 29, 1941	14.97	24.80	2.96	95.61	56.62	119.63	0.16	46.48	3.43	196.21
Average for week, 1936–40	23.65	73.94	6.15	159.70	79.46	148.98	1.58	50.92	4.41	180.83

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN SHASTA AND SISKIYOU COUNTIES, CALIF.

Under date of December 2, 1941, Dr. Bertram P. Brown, Director of Public Health of California, reported plague infection proved by animal inoculation and cultures, in fleas from ground squirrels, *C. douglasii*, as follows: In a pool of 31 fleas from 2 ground squirrels, and in another pool of 18 fleas from 1 ground squirrel, submitted to the laboratory on October 24 from locations 26 and 28 miles north of Redding, Shasta County, Calif.; in a pool of 27 fleas from 2 ground squirrels submitted on October 21 from property 3½ miles north and ½ mile west of Mount Shasta City, and in a pool of 91 fleas from 4 ground squirrels submitted on October 22 from a ranch about 2 miles northeast of Edgewood, both locations in Siskiyou County, Calif.

TERRITORIES AND POSSESSIONS

HAWAII TERRITORY

Plague (rodent).—A rat found on November 17, 1941, at Paauhau, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

FOREIGN REPORTS

BERMUDA

Dengue.—Cases of dengue have been reported in Bermuda as follows: Weeks ended—Nov. 1, 255 cases; Nov. 8, 129; Nov. 15, 99; Nov. 22, 247; Nov. 29, 194.[1]

BRITISH EAST AFRICA

Tanganyika Territory—Cerebrospinal meningitis.—During the period June 29 to September 27, 1941, a total of 815 cases of cerebrospinal meningitis, with 136 deaths, was reported in Tanganyika Territory, British East Africa. From June 29 to July 26, 1941, 52 cases with 9 deaths were reported. The number of reported cases of cerebrospinal meningitis and deaths from the disease, by weeks from July 27 to September 27, is as follows:

Week ended—	Cases	Deaths	Week ended—	Cases	Deaths
Aug. 2	14	2	Sept. 6	80	15
9	79	16	13	93	11
16	94	14	20	102	23
23	57	12	27	167	19
30	77	15	Total, July 27–Sept. 27	763	127

CANADA

Provinces—Communicable diseases—Week ended November 15, 1941.—During the week ended November 15, 1941, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis	1	4	2	----	4	1	1	1	3	17
Chickenpox	----	33	----	237	457	[1] 66	60	16	107	985
Diphtheria	----	30	3	33	4	10	1	----	1	82
Dysentery	----	----	----	3	7	----	----	----	----	10
Influenza	----	16	----	----	2	1	2	----	13	34
Lethargic encephalitis	----	----	----	----	----	1	----	----	----	1
Measles	----	----	----	399	29	28	8	6	7	477
Mumps	----	6	----	357	142	42	28	6	76	657
Pneumonia	2	2	----	----	3	----	2	----	12	21
Poliomyelitis	----	----	8	2	----	1	----	----	1	12
Scarlet fever	2	20	31	71	227	16	32	23	34	456
Tuberculosis	3	7	8	79	57	2	25	----	----	181
Typhoid and paratyphoid fever	----	----	----	11	----	----	1	----	----	12
Whooping cough	----	15	1	562	132	1	1	21	50	783

[1] Includes 1 nonresident.

[1] See also PUBLIC HEALTH REPORTS of October 30, 1941, page 2137.

CUBA

Provinces—Notifiable diseases—4 weeks ended November 8, 1941.—During the 4 weeks ended November 8, 1941, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		4	15		8	28
Chickenpox		1				4	5
Diphtheria		11	2	1	5	4	23
Hookworm disease		19		3			22
Leprosy		8	1		1		10
Malaria	289	33		32	3	76	433
Measles		17	29				46
Scarlet fever		2	1				3
Trachoma		1		2			3
Tuberculosis	16	57	22	61	17	49	222
Typhoid fever	18	59	19	24	14	35	169
Whooping cough	1						1
Yaws						556	556

[1] Includes the city of Habana.

JAMAICA

Communicable diseases—4 weeks ended November 22, 1941.—During the 4 weeks ended November 22, 1941, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		1
Chickenpox	2	8	Puerperal sepsis	1	2
Diphtheria	3	6	Tuberculosis	34	64
Dysentery	7	3	Typhoid fever	13	64
Erysipelas		1			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

Afghanistan—Southern Province.—During the week ended December 6, 1941, cholera was reported present in the Southern Province, Afghanistan.

Plague

Peru—Lima Department.—During the month of October 1941, plague was reported in Lima Department, Peru, as follows: Huaura, 4 cases, 2 deaths; Sayan, 1 case, 1 death.

Yellow Fever

Brazil—Para State—Irituia.—On October 8, 1941, 1 death from yellow fever was reported in Irituia, Para State, Brazil.

Ivory Coast—Abengourou.—On November 30, 1941, 1 suspected case of yellow fever was reported in Abengourou, Ivory Coast.

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